Conceptions of research methods learning among psychology undergraduates: A Q methodology study

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Abstract

A range of conceptions held about research methods learning have previously been identified. The current study aimed to examine in-depth shared conceptions among undergraduate psychology students. Utilising Q methodology, which links both quantitative and qualitative methodologies to uncover the subjective viewpoints that a group of individuals hold towards a particular domain, participants ranked statements reflecting different conceptions of research methods learning. Ranks were then factor analysed and four distinct profiles of student conceptions were identified, labelled and described in qualitative detail: *Research methods as integral to psychology*, *Research methods as a digression from psychology*, *Research methods as disconnected from psychology* and *Research methods as beneficial to psychology*. Some of the perspectives displayed a clear understanding about the reasons for undertaking research and learning about research methods in psychology, whereas other standpoints saw research as being something that was difficult to relate to the practice of psychology. Findings are considered in terms of how some conceptions appear to be more beneficial or problematic to hold than others and recommendations are made to educators about how they could support students to change their views.

Keywords: Conceptions of Research, Research Methods Learning, Adult Learners, Epistemological Beliefs, Q Methodology

Conceptions of research methods learning among psychology undergraduates: A Q methodology study

The conceptions held by students about the topic they are studying may impact on their learning outcomes (Van Rossum & Schenk, 1984). Conceptions of learning involve learners' knowledge and beliefs about the characteristics of the subject being learned (Vermunt & Vermetten, 2004), including personal epistemological beliefs they hold towards their learning. While some research describes conceptions as merely the understanding of concepts (e.g. Alvermann & Hynd, 1989; Hynd, Alvermann, & Qian, 1997), the current research sees conceptions in the broader sense that includes attitudes and beliefs, since the terms conception and belief tend to be used synonymously in the literature (Pajares, 1992). Furthermore, concepts involve a shared and generally universal understanding of a particular notion or idea, whereas conceptions are grounded in individual experiences that represent differing understandings of a concept (Entwistle & Peterson, 2004; Vosniadou & Brewer, 1992). In this context, conceptions are formed from experiences and the environment in which learning is taking place, so they consequently vary between people based on their individual experiences and involve their personal beliefs about how they are learning. Students are therefore likely to have views about the nature of the topic being learned and the instructional approaches that should be utilised (Wheeler & Montgomery, 2009), which may affect the way they learn it, as well as how they apply the skills they have developed in 'real-life' (Kawulich, Garner, & Wagner, 2009). Entwistle and Peterson (2004) note that conceptions are context-specific, so they vary based on the subject being studied. Conceptions of learning about research methods are likely to be based on prior experiences of undertaking research (Brew, 2001; Meyer, Shanahan, & Laugksch,

2005), and they may affect students' ability and inclination to learn the subject (Murtonen, 2005b), particularly if reflecting negative attitudes (Murtonen & Lehtinen, 2003).

Conceptions of research methods learning

Research methods classes are a feature of many social science degree programmes (Hosein & Rao, 2017). In the United Kingdom (UK), it is a requirement for British Psychological Society accreditation to have a research methods component as part of an undergraduate psychology degree programme (British Psychological Society, 2017). This aspect of students' programmes has been found to equip them with useful transferable skills and abilities that they can use as graduates (Bauer & Bennett, 2003). Kelly and Bronstein (2003) noted how no other classes involve students having so many preconceptions as research methods classes. Research methods courses are also seen to be the most challenging aspect of psychology and social science degrees (Murtonen & Lehtinen, 2005), leading to many students having negative attitudes; demonstrating a lack of interest (Vittengl et al., 2004), anxiety due to its perceived importance (Papanastasiou & Zembylas, 2008) and poor understanding of research methodology (Lehti & Lehtinen, 2005).

Students have been found to have a range of conceptions about research methods learning (Murtonen, 1999). Some students may have difficulties with the concept of meaningful scientific research being conducted on human beings. For instance, Estes, Chandler, Horvath, and Backus (2003) found that students (all of whom had studied at least one course in general psychology) had more negative epistemological beliefs about research on psychological development than biological development, with criticisms relating to issues of the validity of psychological measurement. Murdoch-Eaton et al. (2010) ascertained that undergraduate medical students understood the importance of doing research, but their perceptions of what is

involved with research differed from that of their instructors. In view of this, they advised that students should be taught 'what research is' at an early stage of their research methods instruction. There is no uniform conception of what research is (Lehti & Lehtinen, 2005), which means it is difficult for individuals to hold definitive misconceptions about research (Kawulich et al., 2009). However, Stacks (1993) identified several unhelpful 'myths' thought to be held by students, including: research being considered to be maths; research as simply involving the memorisation of how to compute analyses; and research being seen as completely unrelated to students' future careers. Denham (1997) notes that a "first-day discussion" about the purpose of learning research methods can remove these myths and reduce negative affective reactions to learning the topic.

It has also been noted that the ability to acknowledge the links between research methods and the 'real-world' is as important as having knowledge about the links between research methods concepts (Denham, 2003). Kawulich et al. (2009) found that students differed in their feelings about the value of undertaking research, their understanding of what research involves, and their expected research project outcomes. Some undergraduates have felt that involvement with research is not relevant until undertaken at postgraduate level (Buckley, 2011), hence it is difficult for these students to understand the purpose of taking research methods courses. For that reason, it has been claimed that effective research skills development requires students to be aware of the entire research process (Walkington et al., 2011). Seymour, Hunter, Laursen, and Deantoni (2004) also found that some students expressed an increased ability to relate their research findings to the "bigger picture" of their specific field after undertaking a research methods course. However, it is not clear whether this conception is held by students in general or is simply a marginal perspective.

Murtonen and Lehtinen (2003) explored the perceived difficulties experienced by students while learning about research methods. Students articulated five difficulties including superficial teaching, an inability to link theory and practice, unfamiliarity and difficulty with the concepts and content used in research, an inability to create an integrated picture of the different parts of scientific research, and negative attitudes in general towards research methods courses. These difficulties with research methods were found to be unrelated to students' difficulties with the other study areas of their programmes. Entwistle and Peterson (2004) noted that, as instructional methods change from secondary to higher education, this is likely to cause a tension with students' existing conceptions about how their courses should be taught. While this may apply to many aspects of instruction at university level, it has been specifically suggested that research methods classes are usually taught in a way that is thought to alienate students (McGinn & Roth, 1999). These difficulties are likely to be the reason why some students see research as being something that only particularly intelligent people do (Freymond et al., 2014).

Murtonen (2005b) found that students also differ in the extent to which they appreciate quantitative and qualitative methods and how ready they are to use either approach, indicating a tendency to "choose their side" between the two approaches. Many students have been found to display a preference for qualitative methods due to the perception that quantitative methods are more difficult to understand (Nenty, 2009). Murtonen and Lehtinen (2005) highlighted how conceptions relating to a preference for one research orientation are problematic and could hinder learning. For this reason, Onwuegbuzie and Leech (2005) advocate the use of mixed methods in research methods courses, rather than having separate quantitative and qualitative modules. While the current research focuses on both quantitative and qualitative methods

learning, it is important to still consider the differing conceptions held by students about this methodological paradigm.

The significance of examining conceptions of research methods learning

Entwistle, Mccune, and Walker (2001) claim that conceptions are likely to be stable since they are built up from previous experiences. However, they also note that they develop as people are exposed to intellectual activities, which then influences their subsequent conceptions and behaviour. Therefore, the experiences of students during their ongoing education are likely to continue to have an impact on their conceptions. For example, students have reported being significantly more interested in research methods after completing a course on it (Vandiver & Walsh, 2010). Contrary to this, Sizemore and Lewandowski (2009) found that students increased their knowledge, but decreased their positive attitudes towards research after a research methods course, so they claimed that attitudes towards research and knowledge of research are independent.

Students who achieve lower grades than they expected on research methods courses may form more negative conceptions, whereas students who have superficial views about the nature of psychological research (i.e. naïve epistemological beliefs about research) are likely to also have misunderstandings in their knowledge. Kiely, Clibbon, Rea-Dickens, Walter, & Woodfield (2004) investigated student teachers' experiences on a research methods course and found that stronger students were more able to see the purpose of research in relation to their developing teaching practice, thus showing that they have a clear conception of the relevance of research. Meyer, Shanahan, and Laugksch (2007) found that students with ambiguous conceptions of research (i.e. students who blur a broad view of research with so called misconceptions) were more likely to express a lower self-expectation of their research methods knowledge, indicating

they were aware of the impact of their own problematic conceptions. Meyer et al. recommended investigating variation in conceptions among students to identify both students at risk of non-completion, and promising students who could be encouraged to pursue postgraduate research.

Murtonen (2005a) highlighted that it is yet to be decided whether problematic conceptions can actually hinder learning outcomes. On the one hand, Murtonen and Titterton (2004) did not find any link between attitudes towards research methods (which included views on research methods instruction, interest in quantitative methods, perceived superficiality of research methods teaching and perceived lack of connection between different aspects of research methods) and achievement in research methods courses. On the other hand, conceptions are expected to have an impact on motivation to use research methods (Murtonen, 2005b), and it has been suggested that negative beliefs about statistics learning may be related to statistics anxiety (Gal & Ginsburg, 1994), which has been negatively linked to achievement in research methods courses (Balloo, Pauli, & Worrell, 2016). While it may not be possible to determine the direct impact of differing conceptions on performance with research activities, research shows that there is the potential for these views to have an effect on motivation, anxiety and achievement related to research. Therefore, the importance of examining conceptions about this domain in more detail should not be underestimated.

The current study

It appears that adult learners are able to clearly convey specific views about research methods learning, but there is no consensus on all of the conceptions of research that exist (Pitcher, 2011). If certain students express a range of conceptions that are tangentially related, it may be possible to build up a student profile based on the conceptions of a group of students. Thus, it seems more appropriate to consider commonalities between conceptions as a means of

exploring in-depth student viewpoints towards the subject and the links between conceptions, rather than aiming to identify every individual conception of research methods (since there appear to be many). While Meyer et al. (2007) established profiles of quantitative variation in conceptions between groups of students, the majority of previous studies have focused on generating a range of conceptions that exist among students in general rather than examining the links between these conceptions. Conceptions are unlikely to develop in isolation, and it is highly probable that students share viewpoints. A deeper investigation into this area may therefore allow for an understanding of how students actually conceptualise this significant aspect of many psychology and social science programmes. Furthermore, since the literature has mainly focused on postgraduate students' (as well as senior researchers') conceptions, it would also be useful to consider the conceptions of undergraduate students who have a research component as part of their degree programme. There are a range of reasons why individuals choose to attend university in the first place (Balloo, Pauli, & Worrell, 2017), so these conceptions may influence undergraduates' decisions to pursue postgraduate study or go into research careers. The research question was as follows: What shared viewpoints of conceptions of research methods learning exist among undergraduate psychology students?

Method

Design

The current study made use of Q methodology to highlight shared viewpoints about research methods learning. Q methodology combines both quantitative and qualitative approaches to attain the subjective perspectives that a group of individuals hold towards a particular domain (Brown, 1980). With Q methodology, participants complete a Q sort in which they sort and rank statements reflecting various attitudes and beliefs about a specific topic (i.e.

conceptions of research methods learning in the current study) on a scale (e.g. ‘most agree to most disagree’, ‘most expected to most unexpected’, etc.) by placing the statements on a grid with a fixed amount of ranks that can be assigned (Figure 1 displays the grid used in the current study). Participants then give open-ended comments explaining the reasons for their highest and lowest rankings. The ranks assigned to each statement are factor analysed by-participant (rather than by-variable) to group together Q sorts with similar rankings. The similar rankings for each factor are expected to represent shared viewpoints, which can then be interpreted qualitatively and holistically to demonstrate the overall perspective being expressed (Watts & Stenner, 2012). The open-ended comments given by participants are then used to substantiate the qualitative interpretations. The main advantage of Q methodology over other approaches in the current context is that it can allow for the examination of an overall viewpoint in-depth, rather than breaking down views into individual conceptions, as has been done in previous research on conceptions of research methods learning.

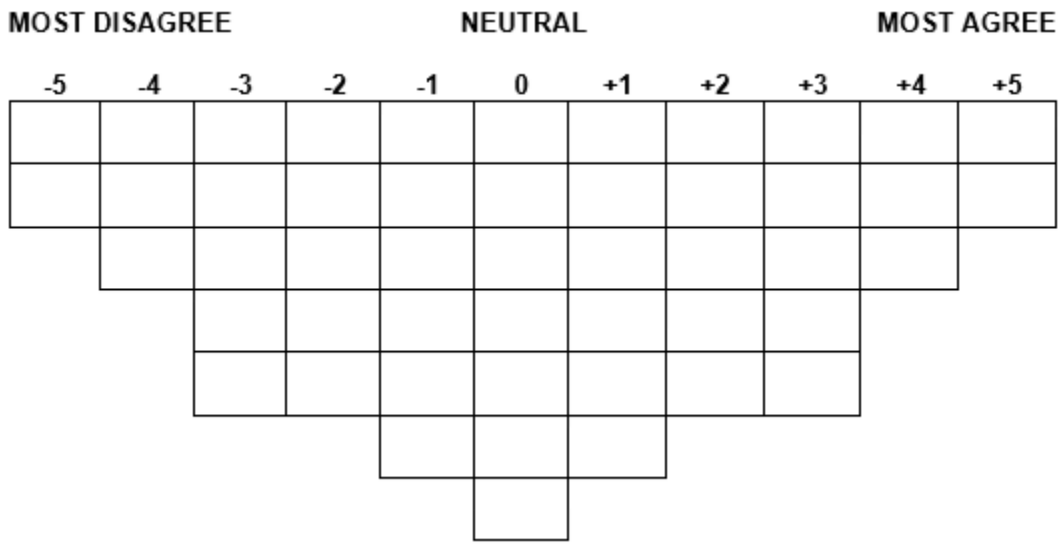

Figure 1. Q sorting grid

Participants

The full sample (including the pilot sample discussed below) consisted of 93 undergraduate psychology students (74 women, 19 men, M_{age} = 21.59 years, SD_{age} = 5.03 years, age range: 18–53 years), 36 of whom were in their first year of study, 30 were in their second year and 27 were in their third and final year of study, from a London-based post-1992 university[1]. All undergraduate psychology students at the sampled university were actively invited to participate during the same academic year in exchange for course credit, so that a range of viewpoints could be obtained. Participants completed the study towards the end of their respective academic years, so that they had experience of using both quantitative and qualitative approaches, and of conducting at least one research assignment (participants were enrolled on year-long research methods courses for the first two years of their degree programmes, assessed by coursework, followed by a final year research project).

Since an opportunity sample was employed, there could have been an issue with under-representation of certain students who did not choose to participate, particularly if only higher-achievers participated. Therefore, participants were also asked to consent to their research methods/research project grades being obtained. An examination of their grades (based only on independent work: research report marks for first and second year students; and research project marks for final year students) showed that some students did not submit any assignments, and overall grades for those who submitted at least a piece of coursework ranged from 17 to 82 (M = 57.30, SD = 11.78) per cent, thus indicating that there was no issue with under-representation of lower performing students or over-representation of higher performing students participating in the current study.

[1] Post-1992 universities are UK institutions awarded university status under the Further and Higher Education Act 1992.

Development of the Q sort

The statements used in a Q sort are meant to represent a sample of all of the views that exist about that domain. Therefore, the first part of the process of writing these statements in the current study involved a literature review of studies on conceptions of research methods learning. Since most of the previous research was focused on postgraduates' conceptions, a focus group was also held with seven undergraduate students (all females, M_{age} = 22.00 years, SD_{age} = 3.70 years, age range: 18–28 years), four of whom were in their first year of study, two were in their second year and one was in their third and final year of study. Participants were from the same undergraduate population from which the main sample was selected and the discussion aimed to capture their views about research methods learning. A thematic analysis (Braun & Clarke, 2006) was then performed on the focus group transcript to identify common themes of undergraduates' conceptions of research methods learning that supplemented the postgraduate conceptions established from the literature review. Finally, some of the statements from a Q methodology study concerning epistemological beliefs about maths learning (Wheeler & Montgomery, 2009) were also adapted to focus on epistemological beliefs about research methods learning instead.

As is standard in Q methodology studies (e.g. Balloo, 2017), all conceptions were written up in the form of statements reflecting differing opinions, rather than facts, about research methods learning. This resulted in a list of 140 statements that was seen to represent the population of views that existed about research methods learning, the breadth of which was then systematically sampled. Each item was then reworded to extract the finer meaning of each conception from the standpoint of an undergraduate student, which resulted in 47 items. Subject-matter and Q methodology experts then each completed a Q-sort with the 47 items and provided

feedback which led to further rewording and the addition of two more items, so the final set of statements consisted of 49 items (see Table 2, column 2 for a list of these statements).

Procedure

Participants began by answering demographic questions about their age, gender and year of study. They were then told that they would be shown a set of 49 statements representing a variety of conceptions, views and beliefs about research methods learning. Statements were administered to participants one-by-one in a random order using the online Q sorting software *FlashQ* (Hackert, 2007). Links to the software were emailed directly to students with clear instructions that asked participants to drag each statement to one of three groups: a group for statements about which they disagreed, a group for statements about which they agreed, and a group for statements about which they felt neutral, unsure or which otherwise left them with mixed feelings. At the next stage, participants were provided with the three groups of statements they just formed as well as a grid of blank places for the statements ranked from -5 (most disagree) to +5 (most agree) (see Figure 1). Participants were instructed to rank the extent to which they agreed or disagreed with each of these statements by firstly dragging the statements about which they most disagreed to the far left of the grid, then working across the grid until all the disagree statements were placed. They then moved onto the agree-group and followed the same process, but in reverse. Finally, with the neutral-group, they allocated the highest available rankings in the grid to the statements with which they felt most agreement and the lowest rankings to statements with which they felt most disagreement. Participants were then instructed to scrutinise their grids once more and shift any statements they wanted to. The final stage involved participants providing open-ended comments explaining why they agreed most or

disagreed most with the four statements placed at the extreme ends of the grid (+5 and -5). The entire Q sort procedure took participants 20-30 minutes to complete.

Pilot study

Prior to the main data collection, the Q sort statements were piloted with a small sample of participants (n = 22) from the target population to test that instructions were clear and each item was receiving a range of rankings (i.e. there were no cards with which all participants only agreed, disagreed or felt neutral about). Participants were asked to communicate any difficulties in understanding of the task, but none did. They were also asked to provide any other feedback about the study, but no modifications were felt to be necessary based on their comments. Therefore, the Q sort was then able to be administered to the main sample without any changes being made. Since the participants from the pilot sample were also from the target population and had completed the exact same Q sort as participants from the main sample would, their responses were incorporated into the main sample data set.

Results

Statistical overview

Q methodology involves the ranks from each Q sort being intercorrelated using a by-participant factor analysis to form separate factors representing shared views (Stainton Rogers, 1995). Since Q methodology is principally a qualitative approach, the aim is to illuminate salient viewpoints rather than generalise findings to an entire population, so a large sample is not necessary and can result in too many unfocused or overlapping viewpoints. Therefore, a decision was made to factor analyse a smaller subset of the full data set. One Q sort was excluded as an inspection of the open-ended responses indicated that the participant did not appear to understand the task. In order to capture a diverse range of viewpoints from the

remaining participants, while reducing confounding effects from the potential 'noise' of a large data set, a purposive sampling approach was implemented. This involved randomly selecting a range of low, middle and high performers from within each year of study, based on their research methods/project grades.

A final subset of 60 Q sorts (20 from within each year of study) were intercorrelated by submitting the 60 x 60 matrix to a centroid factor analysis with Varimax rotation using the specialist Q methodology software, *PQMethod 2.33* (Schmolck, 2002). Varimax rotation was chosen over by-hand rotation, as the latter is more applicable in cases where there is a theoretically expected outcome more related to confirmatory rather than exploratory factor analysis (Brown, 1993). Since each factor is meant to represent a shared viewpoint that will be interpreted qualitatively, an averaged composite Q sort needs to be formed for each factor based on the individual Q sorts that have loaded on it and met the following two criteria: firstly, the square of the factor loading needs to exceed half of the cumulative communality (i.e. the sum of squared factor loadings across all factors for a single Q sort) for that Q sort; and secondly, the Q sort must significantly load on a single factor. Q sorts that have met these criteria are known as exemplars of the overall viewpoint for that factor. In the current study, a seven-factor solution was initially extracted, but this resulted in one factor not having any exemplars. Therefore, solutions for between three to six factors were also considered. The four-factor solution was retained for qualitative interpretation since it accounted for 54 of the 60 Q sorts analysed, included multiple exemplars on each factor, and explained 44% of the study variance. Table 1 displays the factor loadings for each Q sort across the four factors.

Insert Table 1 about here

Based on the factor loadings, *PQMethod* produces a composite Q sort for each factor using a weighting procedure (higher loading exemplar sorts are given a greater weight in the composite Q sort). Each composite Q sort is a weighted average of the exemplars' Q sorts, so they are theoretical Q sorts that are representative of multiple similar Q sorts. Thus, four composite Q sorts were produced in the current study. Table 2 displays the ranks for each composite Q sort side-by-side.

Insert Table 2 about here

Factor Interpretation

The composite Q sorts need to be described in qualitative detail to arrive at clear, gestalt descriptions of the shared viewpoints being expressed. The emphasis at this stage is on the holistic understanding of the subjective point-of-view, rather than an interpretation of the individual statements (Watts & Stenner, 2005). A narrative account for each factor interpretation is provided below. The ranks of relevant statements from the composite Q sorts are stated in parentheses (e.g. 22: +2 means that statement 22 was ranked as +2 in that composite Q sort). The interpretations are aided by open-ended comments from exemplars for that particular factor, given as explanations for why they positioned the four particular statements at -5 and +5 of the grid.

Factor A: Research methods as <u>integral</u> to psychology.

Demographic summary for factor A. Factor A explained 21% of the study variance and had 31 Q sorts loading on it (i.e. 31 exemplars). Exemplars consisted of 8 men and 23 women,

with ages ranging from 18 to 32 (M = 21.32, SD = 2.75) years (six mature students[2]). Six exemplars were in their first year of study, 11 were in their second year and 14 were in their final year. Exemplars' research methods/research project grades ranged from 17 to 82 (M = 61.97, SD = 11.89) per cent.

Interpretation for factor A. Factor A represents a 'bigger picture' view of research. There is an awareness of the research process and recognition of how research fits into psychology (1: -2; 8: -2; 36: -2). It is firmly believed that research methods learning relates to undertaking research beyond the classroom in the 'real-world' (28: -5; 35: -4). Having an interest in research and capability to understand research methods are integral aspects of understanding human behaviour and becoming a psychologist (11: +4; 43: -3; 47: +3). The view being expressed here is that most students choose to study psychology because they have an interest in undertaking research (22: +1): "An interest in human behaviour is the reason why most people become interested in psychology in the first place." (sort 37). Therefore, people who choose to go into research are not seen negatively (34: -5). Research is understood to be multidimensional and creative in nature (29: -4), which further demonstrates a 'bigger picture' view of research and awareness of the value of undertaking research in psychology: "If people are not creative in coming up with new ideas there would never be new breakthroughs. 'What ifs' are a very important part of psychology and also stem from being creative." (sort 2). Since there is a comprehensive understanding of research, it is not seen to be solely about analysing words and numbers (39: -2; 48: -3), and there is no single answer to each study (26: -1) in which

[2] The Universities and Colleges Admissions Service (UCAS) in the UK define a mature student as anyone aged 21 or over at the commencement of their studies. The age categories used in the current study are based on the age of the participant when they commenced studying at university.

researchers merely follow steps (38: -1). Furthermore, quantitative or qualitative approaches are expected to be used pragmatically depending on the nature of the research being undertaken (33: -3), rather than the specific skillset of the researcher (18: 0; 31: -3; 37: -2).

Factor B: Research methods as <u>a digression</u> from psychology.

Demographic summary for factor B. Factor B explained 9% of the study variance and had 10 Q sorts loading on it. Exemplars consisted of three men and seven women, with ages ranging from 18 to 26 (M = 20.80, SD = 2.35) years (two mature students). Five exemplars were in their first year of study, two were in their second year and three were in their final year. Exemplars' research methods/research project grades ranged from 33 to 68 (M = 55.60, SD = 9.99) per cent.

Interpretation for factor B. The standpoint being articulated in factor B indicates an interest in other aspects of the psychology degree beyond research methods and, as a result, there is little aspiration to be involved in research. Although learning about research methods is not perceived to be inherently difficult (20: 0), relating research methods to actually doing research in the 'real-world' is considered to be challenging (35: +2), as they are not thought to have any 'real-world' applications (28: 0): "…I want to focus on helping others in the real world and I don't think statistics and … the methods you use to get the data really help when understanding and aiding real people with real problems." (sort 57). Learning of research methods is also not expected to have a beneficial impact on achievement in other modules that form part of the psychology degree (36: 0; 40: -3; 47: 0). Since there is an assumed lack of benefit and application of research methods learning to students' psychological training (43: -1; 11: -3), this means that it is firmly felt that most students do not get into psychology to do research (22: -5), as reflected by the following exemplars: "I believe most student[s] study psychology to learn

about the human mind, behaviour and the brain, not calculations." (sort 18) and "I did not choose psychology for its involvement with research [and] I know a lot of students hate research methods." (sort 68). The lack of interest in undertaking research may be due to negative feelings about the instruction of the subject. It is sensed that the only way to learn about research methods effectively is by having an outstanding tutor (5: +4) and therefore, difficulties with learning are down to ineffective instruction (24: +4) from tutors who use unhelpful terminology (25: -3): "…Some of the terminology is too complex and unless you have a dictionary next to you, the lecture can be confusing..." (sort 89). It is felt that research is only about knowing the right test to use, memorising facts and procedures, and following steps rather than evaluating material in-depth (16: +4; 30: +3; 38: +1).

Factor C: Research methods as <u>disconnected</u> from psychology.

Demographic summary for factor C. Factor C explained 5% of the study variance and had four Q sorts loading on it. Exemplars consisted of one man and three women, with ages ranging from 19 to 28 (M = 21.50, SD = 4.36) years (one mature student). Three exemplars were in their first year of study and one was in their second year. Exemplars' research methods/research project grades ranged from 23 to 56 (M = 46.50, SD = 15.72) per cent.

Interpretation for factor C. The view being put forward in this account suggests a lack of awareness about why students learn about research as part of their psychology degree. It is not clear what the links are between the different aspects of the research process (1: 0) or how research methods relates to the rest of the psychology degree (36: +2) and becoming a psychologist (17: 0; 43: 0). This means that an interest in research does not seem to be connected to an interest in human behaviour at all (11: -4). A distinction is made between the skills needed for research and those required for the other elements of the psychology degree

(40: -4): "Being bad in math normally means you are good in English. So being bad in research methods may mean you excel elsewhere." (sort 56). Therefore, the view being expressed does not demonstrate an understanding of how learning about research methods fits into the degree as a whole (47: -5). This lack of clarity about the purposes of research methods learning means that it is seen somewhat superficially (26: +1). All aspects of research methods learning are considered to be difficult (20: +5): "I think everything about the module is quite difficult." (sort 12). However, it is thought that everyone can be good at it if they work hard enough (46: +5), as noted by the same exemplar: "If you put in a little effort it is not that difficult to get a good mark in research methods." (sort 12). Therefore the key here is hard work, not confidence (10: 0), motivation (27: +3) or enjoyment (15: -2).

Factor D: Research methods as <u>beneficial</u> to psychology.

Demographic summary for factor D. Factor D explained 9% of the study variance and had nine Q sorts loading on it. Exemplars consisted of two men and seven women, with ages ranging from 19 to 48 (M = 24.11, SD = 9.35) years (two mature students). Three exemplars were in their first year of study, five were in their second year and one was in their final year. Exemplars' research methods/research project grades ranged from 31 to 70 (M = 49.67, SD = 13.37) per cent.

Interpretation for factor D. The factor D account reflects an appreciation of the benefits of learning about research methods. Clear links and benefits are drawn between learning about research methods and learning about other aspects of psychology (36: -5; 40: -4; 47: +3), as well as becoming a practitioner (17: -2; 43: -3). It is clear how research methods classes teach students how to become researchers (1: -4); learning about statistics is seen to be beneficial (4: +3) and the statistical software is viewed as a learning aid (19: +3). Since statistics is seen to be

a significant part of research methods, there is the perception that numbers are a large part of these classes (48: +1), so students need to be competent with maths (3: +1): “You don’t have to be good [at maths] but you need to know where to read your results [and] from which tables.” (sort 53). Since so much emphasis is put on the benefit of research methods learning, this is seen to be something that anyone can master if they work hard enough (46: +5): “I think anyone would be capable of learning something. Of course it might be harder if you do not like it or you have poor skills to start with but possible nonetheless.” (sort 59). Research is not just for intellectuals (6: -5), so practice with research methods is key (7: +5): “The more you do something the better you get and the more confidence you get.” (sort 59). This means that one needs to develop confidence with research methods (10: +4) and it is suggested that working in groups may help with this (12: +4): “It is sometimes easier to ask peers questions about things you don’t understand at the time than a teacher.” (sort 26).

Discussion

The aim of the current study was to identify shared viewpoints of students’ conceptions of research methods learning. Using Q methodology, four distinct viewpoints (factors) consisting of conceptions of research methods learning were labelled and described in qualitative detail. These narrative accounts aimed to capture holistic conceptions from the students’ perspective. By producing these accounts, the current study has been able to form shared profiles of different student groups revealing the links between multiple combined conceptions, rather than purely providing a list of conceptions thought to exist among all students. The advantage of using Q methodology here is that seemingly disparate conceptions have been grouped together, so the exact interrelationships have been able to be explored.

Factor A's viewpoint (*Research methods as integral to psychology*) portrays an all-encompassing and deep understanding of the role of research in psychology. There is an awareness of how research fits into both the study and practice of psychology, as well as a recognition of how research methods learning is related to undertaking research in the 'real-world'. It is believed that people study psychology to do research. This profile reflects similar experiences to those of some of the students in Seymour et al.'s (2004) study, but it goes further to show exactly how the 'bigger picture' of research is viewed; there seems to be a comprehension that research is necessary in order for there to be advances in the discipline. This profile also builds on that research by indicating that not all students hold these views after undertaking research methods courses. It could be argued that the primary aim of research methods instruction is likely to be related to teaching core quantitative and/or qualitative concepts. However, Denham (2003) claimed that an ability to see links between research methods and the 'real-world' is as important as understanding the relationships between different research methods concepts. Therefore, this viewpoint suggests that there may be a beneficial secondary outcome of these classes for some students in which they are clear about the relevance of this subject. As both Walkington et al. (2011) and Murdoch-Eaton et al. (2010) noted, it seems to be significant for students to understand why they are undertaking research and how it fits into their discipline. The factor A perspective indicates that this understanding may take time to develop, and one open-ended comment even specifically pointed to their final year independent research project being crucial to the formation of this conception for them. Previous research has also found that students feel their research skills are developed most through participation in final year research projects (Gresty & Edwards-Jones, 2012). Since the combined conceptions that this viewpoint was comprised of show that a 'bigger picture'

understanding of research goes hand-in-hand with a positive view about learning research methods, this supports the suggestion that increased clarity about the purposes of research should be placed early on in the course (Denham, 1997). Furthermore, independent research may be an influential part of developing a 'bigger picture' view of research, as it directly demonstrates to students how the separate stages of research are connected. Educators may want to consider the implications of this when deciding on the best time to introduce independent research into their research methods curriculum.

Factor B's account (*Research methods as a digression from psychology*) sees research as separate, secondary and unimportant to the 'real' business of psychology; it is felt that students do not choose to study psychology to do research and a cynical attitude is exhibited about research methods learning and the associated instruction of the subject. The pattern being observed in the overall viewpoint indicates that problems with the teaching of research methods may also impact on students' aspirations to go into research. Some of the conceptions expressed directly relate to the 'myths' about research noted by Stacks (1993), including research as being just about knowing the correct analysis to use, while memorising facts and following steps, and research methods learning having no benefit to psychological training. Stacks saw these conceptions as being held by many students, but the current study shows that there are several contrasting perspectives. While the factor A perspective indicates that, for some, research methods classes give students a good understanding of why research is done in psychology, the factor B standpoint suggests that the way these sessions are taught may be perceived as problematic and unhelpful. Furthermore, this disconnect between what instructors are intending to teach, and how students respond to this, may inadvertently be leading to the views that Stacks sees as myths. Murtonen and Lehtinen (2003) found that some of the perceived difficulties

experienced by students while learning research methods were superficial teaching and an inability to create an integrated picture of the different parts of scientific research. Since the factor A 'bigger picture' view of research was linked to an interest in doing research, it could be argued that the instruction of the subject is a key factor influencing students' interests in the subject. There is a wealth of literature on approaches to making research methods instruction more interesting or engaging (for reviews, see Earley, 2014; Wagner, Garner, & Kawulich, 2011), but no consensus about whether there is a universally optimal technique. McGinn and Roth's (1999) assertion that research methods classes alienate students appears to be the case for some students, so educators should be cognizant of this.

Factor C's perspective (*Research methods as <u>disconnected</u> from psychology*) indicates a failure to understand why research methods is a part of psychology at all. This is similar to the factor B account, but that perspective focused on issues with seeing the benefits of research methods learning to the rest of the psychology degree, as opposed to not being able to recognise the purposes of it at all. This view also depicts an apparent difficulty in learning the topic, which differs from the factor B view. This perception aligns with previous research highlighting issues some students have with the validity of psychological measurement (Estes et al., 2003). One reason for this view could be due to the instruction of the subject not being clear enough about the reasons for psychological research being done. Seymour et al. (2004) found that the ability to see the 'bigger picture' of research is likely to be due to the length of time spent learning the subject and the prior experience of the student. This means that, as students gain more research experience, they may become more aware of the 'bigger picture' and change their conceptions. Kawulich et al. (2009) found that some students indicated a 'bigger picture' conception of research at the end of a research methods course, whereas Entwistle and Peterson (2004) claimed

that most students do not take a position on their conceptions until the end of their degree. Thus, it may take a considerable amount of time for conceptual change to occur naturally. However, the absence of a longitudinal design means there is no way to know whether students would advance from this viewpoint over time. Finally, this view appears to be driven by a simplistic notion of what constitutes mastery of research methods and how that can be achieved. While it is felt that students can succeed in research methods through hard work, confidence is not expected to help at all. Since greater self-efficacy beliefs about research have actually been linked to performance in research methods (Balloo et al., 2016), confidence may help with these classes, so it could be useful to encourage this mindset.

Factor D's standpoint (*Research methods as beneficial to psychology*) perceives research methods as beneficial, both in terms of learning about psychology as a discipline, and also becoming a practitioner or researcher. Additionally, the view continues its positive portrayal of research methods by emphasising that all students are capable of learning the subject if they work hard and have confidence. In some ways this account is similar to that of factor A, but the understanding of research in terms of the 'bigger picture' is not as well developed; the factor A perspective was more focused on understanding why research is carried out in psychology, whereas the factor D view seems to put greater emphasis on the instruction of the topic and how it develops useful skills. The factor D standpoint is also in stark contrast to those of factors B and C, since the role of research methods in psychology is not questioned. While this appreciation needs to be considered in relation to the specific structure of these participants' actual research methods courses, this viewpoint does show that the perception that students dislike research methods in general (e.g. Papanastasiou & Zembylas, 2008; Vittengl et al., 2004) may be overstated and perhaps many students are happy to have it as part of their degree. The

factor D view possibly highlights that the significance of the skills developed during the classes could be made more transparent to students. Furthermore, when considering this view in relation to that of factor B, one suggestion for future research could be to explore more specifically which aspects of teaching research methods are working for students and which are not. Finally, there is a sense of inclusivity to this view, in which research methods is seen to be something anyone can master. While the factor C viewpoint did indicate the perception that anyone could be successful in research methods if they work hard enough, in the factor D account there appears to be a more rigorous understanding that hard work requires motivation, and that liking the subject will also help.

Limitations

As the sample of statements rather than the sample of participants strived for representativeness, it is not anticipated that these four viewpoints embody all of the perspectives that undergraduate psychology students hold towards research methods learning. However, the intention is for the conceptions described in the current study to represent some of the most predominant ones in the undergraduate student population. By selecting a sample of participants across all stages of an undergraduate psychology degree, the temporality of views could also be captured by the analysis. Unfortunately, as participants were not followed up at a later stage, it is not clear exactly how malleable conceptions are and whether this is affected by the students' own experiences during research methods classes or other factors altogether.

Conclusions, implications and directions for future research

Considering all of the viewpoints identified from the current Q methodological analysis, it appears that greater clarity about the role of research methods in the discipline seems to be a useful consideration for instructional designers of these courses going forward. While there are

many core concepts and approaches that need to be taught in these modules that cannot be removed, there is the impression that increased transparency about why students are learning the topic could be very constructive. Since stronger students have been found to be more likely to see the purpose of research in relation to their practice (Kiely et al., 2004), close attention needs to also be paid to the students who have more problematic views, such as what Meyer et al. (2007) termed as ambiguous conceptions of research. Since the latter group of students have been more likely to express a lower self-expectation of their research methods knowledge, addressing these conceptions directly may have important implications for reducing anxiety and increasing motivation and interest in pursuing research.

Entwistle and Peterson (2004) claim that learning is enhanced when existing conceptions are challenged. However, this may take some time while students learn more about the domain throughout their degree and are able to challenge their earlier perspectives that they now see as being misconceptions. This may mean that students have negative conceptions for longer than necessary, so perhaps one challenge for instructional designers is to attempt to deal with problematic conceptions earlier in the research methods instruction process. If conceptions are challenged from the first stage of research methods learning, conceptual change may be able to occur more readily, providing an enhanced learning experience. One recommendation to aid this may be to design courses so that students' conceptions about the purposes of research, and how it fits into their education, are incorporated early on. Some students may not have an interest in undertaking their own research, but if they understand its importance, engagement on these courses might improve. Future research would benefit from examining the role of potential causal variables in the formation of these conceptions and how malleable and stable they are over time. Additionally, if conceptions are related to engagement and interest, they may also

explain differences in achievement, which further demonstrates why it is important to continue work in this area. Research on conceptual change indicates that conceptions of learning can also be modified with varying degrees of success through intervention (Tynjälä, 1999; White, 1994), so this may be a promising avenue for further research on conceptions of research methods learning.

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Table 1

Centroid Factor Analysis Loadings of Q Sorts (Varimax Rotated)

	Factor				
	A	B	C	D	h^2
Sort 02	.57***[a]	.32*	.20	-.29	.55
Sort 04	.68***[a]	.12	.03	.33*	.59
Sort 06[b]	.16	.33*	.42**	.27	.38
Sort 07	.35*[a]	.24	.10	.13	.20
Sort 12	-.04[a]	-.05	.49***[a]	-.13	.26
Sort 13	.07	.13	.21	.58***[a]	.41
Sort 14[b]	.21	.22	.34*	.19	.25
Sort 18	.01	.57***[a]	.13	.19	.38
Sort 20	.30*	.07	.12	.42**[a]	.28
Sort 21	.41**	.61***[a]	-.22	-.18	.62
Sort 22	.56***[a]	.14	.38**	.26	.54
Sort 26	.26	-.02	.06	.55***[a]	.37
Sort 27	.37*	.13	-.07	.44**[a]	.35
Sort 30	.41**[a]	.08	.21	.16	.24
Sort 31	.66***[a]	.14	.14	.45**	.68
Sort 33	.65***[a]	.13	-.15	.36*	.60
Sort 34	.56***[a]	.19	.12	.42**	.54
Sort 35	.13	.33*[a]	-.02	.16	.15
Sort 37	.68***[a]	-.06	.25	.28*	.60

	Factor				
	A	B	C	D	h^2
Sort 39	.73***[a]	.17	.26	.22	.67
Sort 40	.67***[a]	.42**	.06	.30*	.72
Sort 41	.63***[a]	.23	.19	.24	.54
Sort 42	-.16	.41**[a]	.18	.15	.25
Sort 43	.30*	.25	.09	.55***[a]	.46
Sort 44	.47**[a]	.24	.19	.28*	.39
Sort 47	.64***[a]	.07	.12	.34*	.54
Sort 49	.56***[a]	.15	.08	.45**	.54
Sort 50	.45**	.07	.07	.52***[a]	.49
Sort 51	.02	.43**[a]	.15	.19	.24
Sort 52[b]	-.18	.28[a]	-.17	.01	.14
Sort 53	.21	-.003	-.04	.43**[a]	.23
Sort 54	.23	.28*	.56***[a]	.16	.47
Sort 55	.62***[a]	.30*	-.02	.17	.50
Sort 56	.08	.06	.56***[a]	.12	.34
Sort 57	.07	.46**[a]	.33*	.12	.34
Sort 59	-.003	.17	.09	.53***[a]	.32
Sort 60	.07	.39**	.46**[a]	.03	.37
Sort 61	.62***[a]	-.09	.18	.04	.42
Sort 64	.31*	.57***[a]	.08	-.29	.51
Sort 65[b]	.24	.33*	.03	.24	.23

	Factor				
	A	B	C	D	h^2
Sort 67[b]	.38**	.42**	.32*	.02	.42
Sort 68	.14	.55***[a]	.10	.08	.34
Sort 70	.67***[a]	-.004	.41**	.31*	.70
Sort 71	.56***[a]	.36*	-.01	.02	.45
Sort 72	.65***[a]	.47***	.06	.12	.66
Sort 73	.68***[a]	.03	.03	.32*	.56
Sort 74	.50***[a]	.40**	.10	.14	.44
Sort 75	.63***[a]	.17	.09	.36*	.57
Sort 76	.53***[a]	.29*	-.07	-.05	.37
Sort 77	.68***[a]	.06	-.01	.13	.49
Sort 78	.29*[a]	-.10	.10	.11	.12
Sort 79	.54***[a]	.20	.18	.46**	.57
Sort 80	.56***[a]	.34*	.11	.01	.44
Sort 82	.20	.60***[a]	-.02	.13	.41
Sort 84[b]	.43**	.06	.42**	.28*	.44
Sort 87	.54***[a]	.26	.04	.26	.43
Sort 89	.39**	.51***[a]	.16	.05	.45
Sort 90	.47**[a]	.03	.42**	.07	.40
Sort 92	.32*	.32*	.09	.48***[a]	.44
Sort 93	.57***[a]	.25	.05	.43**	.57
Eigenvalue	12.71	5.45	3.08	5.48	

	Factor				
	A	B	C	D	h^2
Variance %	21	9	5	9	

Note. $N = 92$. * $p < .05$; ** $p < .01$; *** $p < .001$. [a] Square of the factor loading exceeds half of the cumulative communality (h^2) for that Q sort. [b] Q sort has not met the factor exemplar criteria.

Table 2

Statements used in Q Sort and Comparison of Ranks for Each Composite Q Sort

#	Statement	Factor A	Factor B	Factor C	Factor D
1	There are often no links between collecting, analysing and writing up data	-2	-2	**0**	-4
2	The ability to do research is really just something you're born with	-4	-4	-1	**1**
3	You need to be good at maths to be good at research methods	-1	0	-5	**1**
4	Researchers must be good at statistics	2	1	1	**3**
5	The only way to learn research methods effectively is by having an outstanding tutor	1	**4**	-3	-2
6	Doing research is best suited for intellectuals	-1	-1	**0**	-5
7	With enough practice, anxiety about learning research methods will always go away	4	1	1	**5**
8	It is NOT necessary to have an understanding of the "big picture" of the research before beginning a study	-2	-2	**-1**	-2
9	Qualitative methods are easier to grasp than quantitative methods	2	-1	**3**	0
10	The secret to learning research methods is having confidence in your own ability	**4**	3	0	**4**
11	An interest in human behaviour goes hand-in-hand with an interest in research	**4**	-3	-4	**4**
12	Research methods classes are easier to understand when working in a group rather than individually	1	2	-1	**4**

#	Statement	Factor A	B	C	D
13	Confidence with maths does NOT necessarily lead to confidence with research methods	3	2	**4**	3
14	Students with negative attitudes towards research methods will always experience difficulties in class	3	**5**	1	2
15	Students must enjoy research methods modules if they are to succeed in doing research	2	**3**	-2	0
16	Mastery of research is really just about knowing the right test to use for the study	2	**4**	2	2
17	The terminology used in research methods is of little use to psychologists	-1	-2	**0**	-2
18	Good researchers choose to focus on either quantitative or qualitative methods	0	-3	**4**	1
19	SPSS provides the means of being good at research	2	-1	2	**3**
20	Every aspect of learning research methods is difficult	1	0	**5**	1
21	SPSS hinders rather than helps effective learning of research methods	-3	**0**	-2	-1
22	Most students choose to study psychology because they have an interest in doing research	**1**	-5	-3	0
23	Qualitative methods are an ideal alternative for students who struggle with statistics	**3**	**3**	1	2
24	The difficulty with learning research methods is NOT the methods themselves, but the way they are taught	3	**4**	3	3
25	The terminology used in research methods makes it easier to grasp	**0**	-3	-1	-1

#	Statement	Factor A	B	C	D
26	Research studies should always aim to provide one right answer	-1	-2	**1**	-1
27	Students who are unmotivated to learn and use research methods may still succeed in doing research	0	1	**3**	0
28	Research methods have no 'real-world' applications	-5	**0**	-2	-2
29	Creativity has no place in good research	-4	**-2**	-3	-3
30	Learning to do research mainly requires the ability to memorise facts and procedures	0	**3**	-3	0
31	It is NOT possible to be good at both quantitative and qualitative research	**-3**	-4	-4	-4
32	Qualitative methods are biased by their very nature	**1**	0	0	-3
33	Quantitative methods are only used to test old theories, whereas qualitative methods are only used to generate new ones	-3	-4	**-1**	**-1**
34	People who are interested in research methods modules are "uncool"	-5	-5	-2	**-1**
35	Learning research methods has nothing to do with actually doing research in the 'real world'	-4	**2**	-3	-3
36	There is no connection between the content of research methods modules and the content of other modules on my degree course	-2	0	**2**	-5
37	You are either a quantitative person or a qualitative person	-2	2	**3**	1
38	Doing research requires you to follow a series of steps rather than evaluate material in-depth	-1	**1**	-1	0
39	We can find out all we need to know by interpreting people's words rather than analysing numbers	-2	-3	**1**	0

#	Statement	Factor A	B	C	D
40	Students who are weak at research methods are likely to also be weak in other areas of their degree course	**-1**	-3	-4	-4
41	Qualitative methods are all about feelings and quantitative methods are all about facts	0	1	**3**	-3
42	The most ground-breaking findings in psychology have been achieved with quantitative methods	0	-1	**2**	-1
43	Learning research methods has nothing to do with becoming a practitioner in psychology	-3	-1	**0**	-3
44	You need to be interested in a research topic to write a good quality project about it	**5**	**5**	4	2
45	Quantitative methods give rise to more simplistic interpretations than qualitative methods	1	1	**2**	-2
46	Everyone can be good at research methods if they work hard enough	**5**	2	**5**	**5**
47	The ability to do research methods leads to higher grades in other modules	**3**	0	-5	**3**
48	Research methods is all about numbers	-3	-1	-2	**1**
49	Reading research data is like reading an alien language	0	**3**	0	2

Note. Rankings in bold represent the highest rank assigned for that statement, whereas underlined rankings represent the lowest rank for that statement.